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Self-energy and self-force in the space-time of a thick cosmic string

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Abstract

We calculate the self-energy and self-force for an electrically charged particle at rest in the background of Gott-Hiscock cosmic string space-time. We find the general expression for the self-energy which is expressed in terms of the S matrix of the scattering problem. The self-energy continuously falls down outward from the string's center with the maximum at the origin of the string. The self-force is repulsive for an arbitrary position of the particle. It tends to zero in the string's center and also far from the string and it has a maximum value at the string's surface. The plots of the numerical calculations of the self-energy and self-force are shown. © 2001 The American Physical Society.

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